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### Chronic Lead Poisoning

This article reviews 7 years' experience with the problem of chronic lead poisoning in infants and children in a large children's hospital.

Lead poisoning is still a significant cause of mortality and morbidity in children. Without question, the most important cause of chronic lead intoxication in children is ingestion of lead-containing substances. Scattered small epidemics of acute intoxication due to inhalation of lead fumes from burning storage battery casings have been reported. Of the substances ingested by children, the most widely reported are paint from walls and woodwork and plaster. Other sources are painted furniture and painted or lead toys. In earlier times, lead nipple shields and body powders containing lead were common sources.

In most reported series, the age range of children with lead intoxication is from one to 4 years, the time of life when incidence is highest for all acute toxic ingestions. However, since only small amounts of lead can be absorbed and retained at one time, the abnormal appetite or pica, to cause toxicity, must persist for several months.

Symptoms, when present, almost always relate to the gastrointestinal or central nervous systems. Among the frequent and significant symptoms are anorexia, vomiting, constipation, abdominal pain, irritability, convulsions, drowsiness, incoordination, and pallor. Less commonly reported symptoms include personality change, tremors, and diarrhea. A prodrome of minor gastrointestinal symptoms, such as constipation or abdominal pain, and central nervous symptoms, such as lethargy, may precede by as much as 2 weeks the onset of more serious symptoms of vomiting, coma, or convulsions. Although the symptoms of lead intoxication are obviously non-specific, their association with a history of pica may prove significant.

Often, there are no abnormal physical findings, especially when there is no severe central nervous system disease. Among the most commonly observed signs are pallor, motor weakness, coma, convulsions, papilledema, hyper-reflexia, and ataxia. Respiratory center depression and diaphragmatic paralysis have also been reported. "Lead lines" on the gums which are common in adult plumbism are quite unusual in children.

Almost all children with chronic plumbism have a significant anemia with associated basophilic stippling of the red cells and elevated reticulocyte counts. The stippling and anemia are possibly due to interference by lead with the incorporation of protoporphyrin into hemoglobin.

Lines of increased density in the metaphyses of the long bones as seen by roentgenography are almost always present in children with plumbism. These lines are not diagnostic nor are they areas of increased lead deposition; actually, they are areas of differential calcification. Other bones may also show "lead lines." The laboratory tests which confirm a diagnosis of chronic lead poisoning are the demonstration of abnormally high levels of lead in the blood and urine.



Although many factors from history, physical examination, and laboratory study suggest lead intoxication, there is no single pathognomonic finding. Children may have no symptoms, although their blood or urine lead concentrations are definitely above normal. Such children might receive a diagnosis of potential, subclinical, or asymptomatic lead poisoning. The most significant data for establishing a diagnosis are a definite history of pica for lead-containing substances, suggestive signs and symptoms, anemia with stippling, "lead lines" on x-ray, increased lead and coproporphyrin levels in the urine, and increased lead concentration in the blood. The final diagnosis rests on the clinician's judgment after evaluation of the data at hand.

During the period 1950 through 1956, 43 patients were treated at Children's Hospital, Washington, D. C., because of chronic lead poisoning. No cases of acute lead poisoning, such as is caused by inhalation of lead fumes were observed.

This group of patients with chronic lead poisoning was treated with EDTA. BAL was not used. EDTA was given either intravenously or subcutaneously in the standard dosage of 30 mg. per kilogram per day; in the first 18 cases, 0.5 gm. was given 3 times daily regardless of weight; EDTA was given for 5 days, discontinued for 3 days, and then repeated for 5 days. In the present series, no evidence of local or systemic toxicity from EDTA was noted. In general, treatment was dictated by the clinical status of the individual because the result of the chemical studies for lead were usually not reported for one to 2 weeks and then frequently did not correlate well with the severity of the symptoms. The most critical problem in therapy is the management of the child with lead encephalopathy who is in status epilepticus or coma. Craniotomy and reduction of spinal fluid pressure by repeated lumbar puncture were not consistently used in the present series; the authors found too few data on which to base conclusions as to their efficacy. Intensive supportive nursing care, parenteral anticonvulsants, restricted parenteral fluids, and parenteral EDTA were the mainstays of therapy. Oral EDTA has not been used in recent years because preliminary work showed very little promise.

The observed mortality of 7% in 43 patients is significantly high even though it is an improvement over that noted in many previous reports. More important, the 45% incidence of neurologic and psychiatric residual morbidity deserves serious consideration and further study. Chronic lead poisoning has become an increasingly significant problem as awareness of the diagnosis, treatment, and residuals has increased. Because lead encephalitis is an important killer andcrippler of children, early diagnosis and therapy (with EDTA), as well as adequate and continued follow-up, are essential. The simple expedient of routine inquiry into the presence of pica will bring to light many cases of plumbism before they become symptomatic. Counseling, also, directed at cessation of pica seems to be an effective tool in prevention of continued lead poisoning. Perhaps even more

important are the roles of the private physicians, public health authorities, and lawmakers in preventing the occurrence of this dangerous disease through education of the public, inspection and proper repair of sub-standard housing, and more stringent laws regarding lead-containing paints. (Cohen, G. J., Ahrens, W. E., Chronic Lead Poisoning - A Review of Seven Years' Experience at the Children's Hospital, District of Columbia: J. Pediat., 54: 271-283, March 1959)

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### Prognosis in Essential Hypertension

When referring to life insurance and judging the significance of different forms of therapy in connection with the long-term prognosis in essential hypertension, it is important to know as much as possible about the prospective length of life postulated for an untreated group of hypertensives.

The material for this study consists of patients who were treated in several medical departments in Oslo before 1944, for different ailments, and in whom essential hypertension was discovered casually. The patients had had no special treatment for their hypertension.

The group consists of patients who were under 46 years of age at the time of the registration. The mean age on registration was 38 years for women and 37 years for men. Most of the patients were over the age of 35 when first examined. Those included in the material were found to have a maximum systolic blood pressure of 160 mm. Hg or more, or a maximum diastolic blood pressure of 95 mm. Hg or more.

There were 290 patients of whom 179 (62%) were women, and 111 (38%) were men. This group was recalled for examination several times. In 1950-1951, it was found that 52 women (29%) and 46 men (41%) had died; this mortality was primarily the result of hypertensive disease in a majority of cases. The average period between registration and follow-up examination for the survivors was about 10 years.

Arterial hypertension is not a disease, but a symptom. In this investigation, all proved cases of secondary hypertension, as well as all cases with complications which could be thought to influence the prognosis, were excluded.

In the present material, the mean age is lower than in most other surveys. The range in age difference is also small because only individuals under 46 years were recorded, thereby preventing to a certain degree the chance of including patients who have been hypertensive for a longer time as well as partly eliminating the factor of natural increase in blood pressure with increasing age.

In isolated observations, as in larger materials, it has been shown that patients can live for a long time with considerably increased blood pressure.



However, investigations have shown that high blood pressure commonly has a serious prognosis.

In this series it was found that a high systolic blood pressure over 200 mm. Hg was more frequent in those individuals who later died than in those who survived. It is well known that the mortality in essential hypertension is greater in men than in women. In this material, 58% of the men and 42% of the women died. The difference is so great that one must reckon that the female organism is better able to withstand high blood pressure than is the male.

Levy and associates divided their material as follows: (1) patients with sustained hypertension with relatively fixed increased blood pressure not falling below a value of 160 mm. Hg systolic and not below 100 mm. Hg diastolic; and (2) patients with transient hypertension in whom bed rest produced a fall in blood pressure below the mentioned values. Because this classification depends to some extent on estimation the authors undertook to characterize blood-pressure types more exactly and thus have chosen as a basic character the diastolic pressure. They have classified the blood-pressure types into "labile" and "stable" diastolic pressure.

"Labile" diastolic hypertension was diastolic blood pressure which fell to values below 95 mm. Hg after bed rest and sedatives. Such "labile" diastolic blood pressure was found at registration in 97 individuals of whom 28% of the men and 13% of the women died during the observation period. In the group having "stable" diastolic hypertension in which such a fall was not found, there was a mortality of 54% in women and 75% in men during the period of observation.

Investigations of mortality with methods used for life-insurance investigations give a good idea of the prognosis. Comparison with the population mortality table gives a fair impression of the death rate when the age range is considered. The death rate for individuals belonging to the group with "labile" blood pressure was only 8.3 for women and 20.3 for men per 1000 observation years. This is almost the same as for the total population in the corresponding age group. On the contrary, individuals with "stable" diastolic blood pressure showed a death rate of 47.3 per 1000 observation years for women and 99.3 per 1000 observation years for men; that is, about five times the normal death rate both for men and for women.

The causes of death in essential hypertension are cerebral, cardiac, or renal. Often, several of the systems are affected at the same time. The renal death rate is higher in the earlier investigations, but in more recent and larger investigations, the proportion of renal deaths is about 10%. In this material, the renal death at follow-up investigation was found to be 9% in 1950 - 1951 and 12% in 1957; these findings are taken as evidence that the material did not contain many cases of primary renal disease and that the worse prognosis in men is sometimes due to renal complications. Death caused by cerebral diseases varied from about 20 to 45%



In the present investigation, a higher frequency of cerebral deaths is found, namely 55%. This may be due partly to the fact that all patients who died with cerebral complications have been recorded as cerebral deaths, although there were symptoms of heart failure or renal complications at the same time. This has been found to be correct because the cerebral complications have been the direct cause of death in these cases.

Another reason for the high number of cerebral deaths is probably the age range, because this series consisted of younger individuals under the age of 46 at registration who about 16 years later will still not have reached the age group in which heart failure symptoms are usual.

Cardiac conditions, partly heart failure and partly coronary diseases, were the dominating cause of death in the earlier investigations. Cardiac cause of death is found in only 24% of the material. The majority of such deaths were cases of heart failure while coronary artery disease rarely was found to be the cause of death. Only 6 women (8%) and 6 men (9%) died of myocardial infarction. There is a striking resemblance between the percentage distribution of causes of death recorded in the two follow-up investigations in 1950 - 1951 and in 1957.

At the last follow-up in 1957, few patients were found who were unable to work. Patients working part time were frequently found among housewives, but approximately one-half of the patients living tried to fill a full-time job.

The prognosis was found to be much better in patients with a labile diastolic hypertension—i. e., patients whose diastolic blood pressure went below 95 mm. Hg during bed rest and treatment with sedatives—than in patients with a more stabilized diastolic hypertension. Only 7 (13%) of 54 women and 12 (28%) of 43 men with labile diastolic hypertension died during the observation time. On the other hand, 64 (52%) of 123 women and 48 (75%) of 64 men with more stabilized diastolic hypertension died. (Mathisen, H. S., et al., The Prognosis in Essential Hypertension: *Am. Heart J.*, 57: 371-381, March 1959)

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#### Treatment of Acute Renal Failure

Within the last decade, much progress has been made in the understanding of renal physiology and disease due to the introduction of electron microscopy and percutaneous renal biopsy.

Acute renal failure is a clinical syndrome which is characterized by oliguria-anuria and progressive azotemia with electrolyte imbalance. Diseases such as acute glomerulonephritis, pyelonephritis, or obstructive uropathies are excluded because the injury to the kidney in acute renal failure is confined chiefly to the tubular cells and the basement membrane. It is true that the aforementioned disease may produce acute renal insufficiency,



but the term acute renal failure is reserved for those cases which result from acute tubular damage produced by either nephrotoxic agents or renal ischemia. Acute renal failure is synonymous with the terms acute tubular necrosis, acute toxic nephrosis and—probably the most familiar and popular one—lower nephron nephrosis.

This article summarizes experience with acute renal failure at Milwaukee County Hospital during the last 10 years and outlines what is believed to be correct principles in managing the anuric patient. Generalities of treatment regimen can only be stated and these must be adapted because each anuric patient is a distinct clinical problem.

The course of acute renal failure is divided into three stages: (1) the stage of tubular injury which is of short duration, probably less than an hour, (2) the stage of oliguria and anuria which varies greatly in length but averages from 8 to 10 days, and (3) the stage of tubular recovery.

The authors believe that the syndrome may be minimized or even possibly prevented from developing if vigorous treatment is promptly instituted when the diagnosis is suspected. When hypotension occurs, whether mild or severe, treatment should be intensive. The body responds to a fall in blood pressure by a generalized vasoconstriction in which the kidney vessels participate. The reduction in renal blood flow may cause ischemic change in the renal tubular cells, thus producing the syndrome or possibly potentiate the changes already produced by a nephrotoxic agent. Therefore, the circulating blood volume should be maintained by blood, plasma, or plasma expanders. Pressor substances, such as norepinephrine (arterenol), are of value in this stage. Even though they act by causing vasoconstriction, thereby initially producing a further diminution in renal blood flow, this is short lived because as the blood pressure rises, as shown by Moyer, renal dynamics improve. In addition, myocardial contractility is aided which by increasing cardiac output improves the renal blood flow.

When a toxic substance is ingested, it should be eliminated from the body or rendered inactive by the use of the appropriate measure as quickly as possible. Information from Poison Control Centers now established in most major medical centers is of invaluable aid in accomplishing this end.

Having survived the initial stage of the disease, the patient enters the oliguric-anuric phase which is the most critical. Tubular function has virtually been destroyed and the patient has no means of excreting the products of protein metabolism. Their accumulation will ultimately threaten his life. More than this, the patient becomes a problem in fluid balance. Here it is that the most frequent therapeutic error is made because the patient's small fluid requirements are not appreciated and he is overhydrated. The anuric patient has no effective means of handling an excessive water load.

Usually, 600 cc. of water may be safely supplied daily. This figure is obtained by subtracting from the daily insensible loss the water of oxidation which results from catabolic process. To this may be added varying



amounts of water up to 400 cc. daily depending upon the degree of variation of the patient from the basal state. An equal volume of water must be added to replace urine output, and when there is overt loss which usually occurs chiefly from the gastrointestinal tract.

Of aid in checking the state of hydration is the weight of the patient which can be accurately determined by the use of a bed scale. An anuric patient will lose weight because it is impossible to supply an adequate caloric intake. If no daily weight loss occurs, then the weight is being maintained by the accumulation of excessive water. Water intake should be controlled to produce a weight loss of about 1/2 pound daily.

The body's small supply of endogenous carbohydrate is rapidly exhausted. Carbohydrate must be supplied if protein catabolism is to be diminished and if oxidation of fat is to proceed without ketosis. A minimum of 100 gm. of carbohydrate daily will accomplish this. Because fluid intake is limited, hypotonic solutions are necessary to supply this amount. By using a 10% sugar solution (glucose or fructose) to which is added 95% ethyl alcohol (up to 100 cc. daily), the authors have been able to supply the necessary carbohydrate calories through a peripheral vein.

Oral intake is routinely discontinued throughout the oliguric stage. All fluids and calories are supplied parenterally because only in this way can an accurate measure be obtained. Protein catabolism is thought to be further diminished by the administration of testosterone propionate in dosage of 25-50 mg. intramuscularly daily.

The use of an indwelling urethral catheter is to be avoided because of the certainty of renal infection. The patient should void if at all possible. If the patient does not void every 24 hours, catheterization is done using very careful technique.

As the anuria continues and the azotemia increases, the electrolyte change of first importance is the rise in the serum potassium because it causes a disruption of the conductive system in the heart. The best treatment of potassium intoxication is its prevention. At no time during the oliguric-anuric phase should potassium-containing substances be given. Infections, accumulations of blood, and areas of necrotic tissue should be treated vigorously because these liberate potassium with cellular destruction. Insulin should be given with the carbohydrate for in its presence potassium is transferred intracellularly when glucose is deposited in the liver as glycogen. Twenty to thirty units of regular insulin administered simultaneously with the carbohydrate has been found to be adequate. This offers only a temporary measure, however, because as the glycogen is metabolized potassium is returned to the extracellular fluid. Once potassium intoxication has developed, the best treatment is dialysis.

As part of an integrated plan for the treatment of renal failure, the artificial kidney is a valuable instrument. It is not a substitute for good medical management, but is an adjunct in therapy. It provides means to gain



additional time to allow the damaged kidneys to reconstruct themselves if possible and to resume physiologic function.

Important factors in making the decision as to when to dialyze are: the evaluation of the patient's general appearance, the cardiorespiratory status, and the irritability of the neuromuscular system. The only two contraindications to dialysis are: active bleeding from any source, or prolonged hypotension just prior to dialysis.

Treatment during the stage of tubular recovery, the diuretic phase, consists in supplying electrolytes as dictated by the serum levels and urinary excretion. Reabsorption by the tubular cells is faulty at this time and sodium and potassium depletion may occur. Fluids are given to maintain a urinary volume of 2500 to 3000 cc. daily. As azotemia decreases and nausea lessens, oral fluids are started. Small amounts of 20% lactose are used initially and then other fluids added. Protein foods are generally not added until the N. P. N. is below 100 mg. %, and then protein restriction is continued until the N. P. N. returns to normal. During this stage, the patient is rehabilitated as rapidly as possible with special attention being given to the vigorous treatment of any renal infection.

The prognosis of acute renal failures is poor and is dependent to a great degree upon the nature and severity of the precipitating injury or illness as well as the extent of the renal lesion.

Shock was the cause of failure in 21 patients in this study, whether surgical, traumatic, or hemorrhagic. Incompatible blood transfusion was the second most important causative agent. Whatever the source, renal failure is more apt to occur in patients from 30 to 70 years of age.

The mortality may be reduced if the patient is closely managed by a regimen which (1) rigidly restricts fluid and electrolyte intake, (2) controls protein catabolism, (3) minimizes serum potassium rise, and (4) supports the cardiovascular system. (Schulz, E.G., Murphy, F.D., Treatment of Acute Renal Failure: A.M.A. Arch. Int. Med., 103:125-130, March 1959)

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### Pulmonary Cystic Disease

Cyst formation in the lungs is gaining prominence as a topic of discussion in the current literature on respiratory diseases. Interest in this abnormality evolved from observations in the phenomenon of spontaneous pneumothorax. Prior to 1932, the latter was universally considered as due to tuberculosis.

Published reports on cystic disease discuss more commonly observations on cysts of bronchial origin. An increasing literature on the subject indicates, however, that emphysematous blebs and bullae of alveolar origin occur more frequently. In reports on bullous emphysema, the occurrence of



spontaneous pneumothorax is a commonly described symptom complex, and the procedure of underwater seal catheter decompression of the collapsed lung is stated to be a successful therapeutic measure in obtaining lung expansion. The utilization of exploratory thoracotomy for the purpose of carrying out excision of the cystic areas with the view of preventing the recurrence of spontaneous pneumothorax is not adequately stressed. Similarly, occurrence of infection within the cyst and hemoptysis, likely caused by a sudden increase in pressure within it, are not described frequently nor are these complications generally known. Clinical investigators of this subject have posed a number of inquiries, such as: their congenital or acquired origin; whether antecedent respiratory infection may be contributory to their development; whether generalized emphysema accompanies localized cystic degeneration confined to a lobe or segment of a lobe; and whether a correlation exists between the severity of symptoms and the number and size of the cysts. This article is concerned with the developmental variety of cyst. It is characterized by progressive destruction of the interalveolar septa within a lung segment. This leads to bulla or cyst development and ensuing compression of contiguous lung parenchyma.

The present study concerns a group of 21 cases of cystic disease confirmed by exploratory thoracotomy which was performed in service hospitals, private institutions, and facilities of the Veterans Administration. Observations were made with reference to symptomatology, roentgenological abnormalities, history of respiratory infection, incidence of cyst infection, occurrence of hemoptysis, and spontaneous pneumothorax, surgical findings, operative procedures, and the histopathological pattern of the resected specimens. In evaluating the components of the total picture of cystic disease, a striking feature of this study is the high incidence of roentgenological abnormalities that obscured the true nature of the underlying pathology confirmed at the time of exploratory thoracotomy.

Cystic disease has been described variously as "air-cell," "cystic emphysema," "air cyst," "giant bulla," "emphysematous bleb," "bullous emphysema," "pneumatocoele," "broncho alveolar cyst," "alveolar cyst," et cetera. It is classified into two anatomical types, bronchial cyst and alveolar cyst. The former is considered congenital in origin; the latter, acquired. Another classification refers to the mode of localization, such as cyst formation within a lobe designated as localized emphysema; and a second type, the generalized type in which bullae and blebs are part of a diffuse bilateral hypertrophic emphysematous process.

Recognition of cystic disease on the roentgenograph may be relatively easy or extremely difficult. Very small emphysematous bullae or blebs may not be recognized. In several reported series in which exploratory thoracotomy was performed to forestall future episodes of spontaneous pneumothorax, no abnormalities were seen in 91% of preoperative films. The general characteristics of cystic disease are ill-defined zones of increased radiance



in some portion or portions of the lung; diminution and sometimes complete absence of the bronchovascular markings, the so-called "phantom lung" pattern; or a thin wall structure that encompasses an area of increased radiance, the so-called air cyst. Moreover, in cystic areas in which considerable pressure buildup has occurred, a guide to the basic pathology will be found in the compressed portion of the lung lying in apposition to the cystic area. Under these circumstances, the compressed portion of the lung may be erroneously interpreted as a zone of localized fibrosis. Actually, it is an anatomic variation resulting from compression by a neighboring cyst. Another phenomenon that is a helpful guide in the localization of lung cysts is the recognition of linear bands of density within a zone of increased lung radiance. They are called "trabecules" and are the shadows produced by fibrous bands that frequently traverse air cysts. They usually arrange themselves in a vertical manner. Regarding the difficulty in recognizing the small bullae or blebs that have precipitated episodes of spontaneous pneumothorax by their rupture, Shefts et al. report that in their observation of such cases they are able to detect the blebs or bullae more readily during the early phases of lung expansion.

Exploratory thoracotomy is proving to be a realistic and fruitful approach to the problem of spontaneous pneumothorax, as well as the arrest of continuous dyspnea that is associated with cyst formation which is accompanied by compression of normal lung parenchyma. (Joress, M. H., Pulmonary Cystic Disease - Observations in Cases Treated by Exploratory Thoracotomy: Dis. Chest, XXXV: 256-264, March 1959)

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### Segmental Resection for Pulmonary Tuberculosis

Segmental resection made possible through the advent of antimicrobial therapy is an established and accepted procedure in the surgical treatment of pulmonary tuberculosis. The rate of sputum conversion has been found to be high and the morbidity and mortality rates are low. One of the greatest values of segmental resection is its preservation of pulmonary function.

Patients with a very limited pulmonary function have been accepted for segmental resection, e. g., resection of two segments and one sub-segment on the only remaining left lung following a previous pneumonectomy. Of 335 patients, 12 are dead and 170 have been restudied. Ninety-two patients were excluded as the observation time was less than one year. Fifty-eight patients refused reinvestigation mainly because they did not like to have another bronchspirometry. Of these, many are well and working full time, but it has not been possible to obtain a personal restudy. Four patients from abroad are well and working, but have not had postoperative



lung-function tests. About one-half of the patients (47%) had bilateral tuberculosis. Seven patients had an open cavity in the contralateral lung. Sixty-one patients had had a cavity in the contralateral lung closed at the time of surgery: in 40 cases by a pneumothorax, in 17 by a thoracoplasty, and in 4 cases by conservative measures. In 17% an extrapleural resection with a decortication of the remaining lung was necessary.

Age in itself is not a contraindication for segmental resection in cavitary tuberculosis. The oldest patient, a 64-year old man, tolerated well a segmental resection of the apical segment of the right upper lobe and a small thoracoplasty in one stage. Five years after operation he is in good condition and has negative guinea pig tests of the sputum and gastric washings.

The postoperative course must be carefully supervised in older patients. Perfusion of blood through nonventilated areas of lung will decrease the arterial oxygen saturation, causing symptoms of coronary insufficiency. When there is an insufficient ventilation in the postoperative course which cannot be immediately improved by more conservative measures, a tracheostomy with prolonged artificial ventilation should be instituted to guarantee the patient a normal oxygen and carbon dioxide tension.

Eight patients were operated on under the age of 20, the youngest being 9 years old. In 6 of these young patients, no space-diminishing procedure was needed. In one, an extrapleural pneumothorax space was developed at the end of the resection and filled with air to diminish the intrapleural space after the operation. In one patient, the diaphragm was mobilized around its periphery and resutured at a higher level. This latter operation is not recommended for general use as it results in impaired lung function. However, in young and growing patients under the age of 20, it may occasionally be the best space-diminishing procedure. In the above case, there was 25% of oxygen uptake on the left side after the procedure. The ventilation, however, was only 11%.

The indications for segmental resection were: (1) tuberculous cavitation in 314 cases (94%), (2) bronchiectasis with positive sputum in 5 cases, (3) bronchial stenosis in 2 cases, (4) tuberculous empyema with bronchial fistula in 2 cases, and (5) tuberculoma in 12 cases.

Twelve patients died. The operative mortality was 1.5%. The cause of death in 3 patients was ventilatory insufficiency. One 59-year old woman with bilateral cavitary tuberculosis died 2 days after operation in spite of artificial ventilation by respirator through a tracheostomy. One 41-year old man had had a tuberculous cavity in the right lung treated by pneumothorax for 6 years. The third patient who died from ventilatory insufficiency was a 38-year old man who had had a seven-rib thoracoplasty on the right side 6 years earlier. A resection of the apicoposterior segment of the left upper lobe plus a wedge of left lower lobe was performed for cavitary tuberculosis. One patient died from hemorrhage despite 13 units of blood by transfusion.



One 30-year old patient who, 5 years earlier, had had an extrapleural pneumothorax on the left side for cavitary tuberculosis, underwent resection of the posterior segment of the right upper lobe. After operation, she vomited and died of an aspiration pneumonia. Seven other patients in this series have died since operation. The causes of death included cirrhosis, carcinoma, hepatitis, suicide, cerebral hemorrhage; one patient died following rupture of a tuberculous cavity on the right side 14 months after a segmental resection on the left. A 44-year old man died 2 years after operation from an unknown cause. Nonfatal complications occurred in 15% of cases of segmental resection.

Of the 170 patients followed from one to 6 years, it has been gratifying to find 97% with a negative direct smear and 94% with a negative culture and guinea pig test of sputum and gastric washings. Ninety-two percent were working full time. The incidence of impaired arm movements, pain, cough, and dyspnea was recorded. The best cosmetic result and best arm movements were obtained when no thoracoplasty was added. The diaphragm mobilization gave the best cosmetic but the worst functional result of the different space-diminishing procedures. The osteoplastic thoracoplasty gave a better cosmetic result and better arm movements when compared with a thoracoplasty with rib resection. There was a higher incidence of postoperative pain in the group in which rib resection thoracoplasty was performed. The late functional result was encouraging and it has been proved that segmental resections can be performed with a minimal loss of function. The contralateral side withstood resection very well. (Björk, V.O., Segmental Resection for Pulmonary Tuberculosis - An Analysis of 335 Cases: J. Thoracic Surg., 37: 135-147, February 1959)

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#### Study of Patients with Acute Large Bowel Obstruction

In many patients with carcinoma of the colon, acute intestinal obstruction develops at some time in the evolution of the symptom complex. The obstruction may be mild and spontaneously reversible. When it persists, a serious physiologic problem is added to that of cancer. Two hundred and twenty-seven patients with colon cancer complicated by obstruction of the large intestine are presented. In these cases, the disease did not permit the surgeon to follow the usual course of elective definitive resection. In every instance, there was the challenge of the urgent situation produced by acute obstruction; the patient had to be salvaged from the emergency situation before treatment of the primary disease. The authors were particularly interested in studying the following aspects of this problem: (1) pathologic anatomy of the obstructing lesion; (2) pathologic physiology of



the acute colon obstruction; (3) presence of associated small bowel distention; (4) physiologic basis and the scope of treatment; (5) indications for emergency surgical decompression of the large bowel; and (6) the use of cecostomy and transverse colostomy.

One thousand and five consecutive patients with carcinoma of the colon were studied. In this group, 227 patients demonstrated colon obstruction. This is said to be present when the normal passage of intestinal contents is hampered; clinically, it is manifest by obstipation with varying degrees of abdominal pain and distention. Confirmatory evidence is offered by scout films of the abdomen and operative findings. Well over three-fourths of the obstructive lesions were in the left portion of the colon. Twenty percent of the obstructions, however, were found to have stemmed from lesions of the right segment of the colon.

The commonest gross lesion encountered was the annular constricting lesion. This was complicated in about one-fifth of the instances by necrosis and ulceration, and by variants of the inflammatory process: edema and abscess. Obturation obstruction by barium administered by mouth for diagnostic gastrointestinal series was noted in 10 patients.

What causes a chronic, slow growing constricting lesion to obstruct acutely the lumen of the bowel? Including the few obturation obstructions with those tumors demonstrating gross inflammatory changes, a credible answer may be found for about one-quarter of these patients. The mechanism is a rapidly reversible one and probably accounts for the often recorded clinical observation of ease of relief of obstruction by self-administration of enemas and passage of feces and flatus following surgical decompression operations.

About three-quarters of these patients complained of colicky abdominal pain. Somewhat less than one-half had obstipation lasting 3 to 5 days, and vomited more than once daily. Eight patients presented themselves with historical and physical features leading to a clinical diagnosis (including radiography) of apparently pure small bowel obstruction on admission. At the time of admission, approximately one-fourth of these patients had distention and hyperactive peristalsis. Evaluation of the scout film of the abdomen at the time of admission demonstrated slight to marked small bowel distention in 40% of these patients.

A distended small bowel—whatever the cause—must be reckoned with. Vigorous preoperative replacement with fluids and electrolytes is indicated when small bowel distention is recognized. Geriatric patients with serious metabolic, respiratory, and cardiovascular disease are affected; the complicating medical condition may be adversely affected and may decide the issue in the face of fluid and electrolyte losses caused by small bowel obstruction. Tube decompression is the mainstay of the preoperative preparation and should be included in all such cases.

The data demonstrate the changing character of the problem of obstructing colon carcinoma. While, in 1945, Rankin was able to state that most of



these cases of obstruction could be managed successfully with conservative nonsurgical measures, about three-fourths of the patients in this study needed surgical decompression. Rankin, as did Wangenstein, alluded to the appearance of small bowel distention as a late sign in the syndrome of large bowel obstruction. It was recognized that small intestinal obstruction could result from direct extension of the malignant and inflammatory process of the colon. No emphasis was placed on the more subtle types of small bowel distention due to either malfunction or dysfunction of the ileocecal colic segment.

As Wangenstein demonstrated in the small bowel, the majority of the material in the large bowel is of extrinsic origin; changes in the large bowel develop as a result of the dysfunction in the terminal ileum. It is this segment of bowel in the patient with the diseased colon that offers resistance to the gradient of emptying from the small bowel into the large bowel. At the same time, it is this segment that continues to empty into the obstructed colon. The result is not only a closed loop obstruction, but what is termed a "tension closed loop obstruction" arising from the greater sensitivity and the greater muscular activity and contractility of the terminal ileum and the ileocecal papilla in comparison with the right segment of the colon or cecum. Except in cases of barium enema, the pressures in the right segment of the colon never approach the larger pressures that exist in the terminal small intestine.

These pathophysiologic considerations should be reflected in the therapeutic approach to the problem. First of all, probably in every case, a certain degree of small bowel obstruction exists. Consequently, Levin tube and long tube suction are of tremendous immediate importance in the emergency treatment and preparation of the patient. This decompression helps prevent the continued emptying of the terminal ileum into an already distended colon. Regardless of the improvement achieved with the suction for the small bowel, it is important to keep in mind the concept of tension closed loop in the colon. If there is not relief of the obstruction in the large bowel in a matter of 12 to 24 hours, surgical intervention becomes imperative.

It is difficult to see how there can be a controversy between the conservative regimen of therapy and surgical decompression. The authors' experience indicates that one cannot do without the other. The conservative regime should be instituted as an emergency in these seriously ill patients. Time must be taken for supportive therapy, tube suction, and antibiotic and antispasmodic medication. Of equal importance, is the time necessary to make a complete diagnosis not only of the intestinal situation, but also of the entire medical status of the patient, particularly the cardiovascular, metabolic, nutritional, and hematologic status. Usually, in 12 to 24 hours the patient is vastly improved. The medical and surgical diagnosis is clarified. In 25% of cases the conservative regimen may obviate the necessity for surgical decompression preliminary to resection. In approximately three-fourths of the



patients, surgical decompression is indicated because no flatus has been passed and there is no indication that the obstruction in the large bowel has relented to any degree. In patients who are well prepared, surgical decompression will be more successful with less morbidity and mortality. In a certain number of patients, it may be possible to do a definitive resection, particularly with lesions of the right segment of the colon and the cecum.

Most interesting to consider is the place of surgical decompressive measures, specifically cecostomy and transverse colostomy. In the average situation, cecostomy is safer and is as effective as a decompressive maneuver. The authors' clinical and experimental studies support this contention. Further, there is evidence to support the statement that cecostomy for decompression followed by resection is an effective and safe course of therapy. Mortality is considerably lower when this plan is followed in both the poor risk and the average patient.

Standardization of the therapy for obstructing carcinoma of the colon is another recent development. Obstruction resection has given way to staged surgical decompressive operation followed by resection with end-to-end anastomosis of the colon. Side-tracking in-continuity procedures were rare in this series. There were an appreciable number of "palliative" colostomies. That these are not palliative is apparent considering the average mortality of 42% when this operation is elected. The authors believe that the surgeon should make every effort to achieve resection for palliation in this type of patient. (Ulin, A. W., et al. A Study of 227 Patients with Acute Large Bowel Obstruction Due to Carcinoma of the Colon: Surg. Gynec. & Obst., 108: 267-271, March 1959)

\* \* \* \* \*

#### Prophylactic Castration in Carcinoma of the Breast

The beneficial effects of oophorectomy as a palliative procedure in advanced mammary carcinoma have been known for more than 60 years. With increasing knowledge of the relationship of certain malignancies to hormonal functions—particularly the estrogen-dependent carcinomas of the breast—castration by surgical means or by irradiation of the ovaries has become more widely practiced in the management of metastatic cancer of the breast.

In contrast to the acceptance of castration as a palliative measure in the treatment of advanced cancers, the suppression of ovarian function either by surgery or by irradiation as a prophylactic method before metastases occur, has been a controversial problem.

Smith and Smith studied the effect of prophylactic castration on 101 patients operated upon for cancer of the breast. Of these, 60 underwent oophorectomy and 41 received radiation therapy to the ovaries. As compared



with a group of noncastrated patients, the survival rates were higher among the castrates, "the most striking and statistically significant differences being in those with axillary metastases . . . In the analyses with reference to age, the difference of the highest significance was between the castrates aged 50 through 59 and the uncastrated controls of the same age." Although in this group, the results following irradiation of the ovaries were not as favorable as those after oophorectomy (40% survival rate in the irradiated groups as compared with 74% in the surgical groups), they were apparently sufficiently encouraging to lead to the authors' conclusion that "the alternative when surgical castration is refused or contraindicated is adequate ovarian irradiation."

The authors' observations comprise a total of 275 women who were below the age of 50 and had been referred to the Tumor Clinic of Michael Reese Hospital during the 10-year period, January 1942 through December 1951. These patients were referred for follow-up examinations after radical mastectomy or, more frequently, for postoperative local x-ray therapy. Sixty-six patients were lost to follow-up studies before the lapse of 5 years; in 9 patients, it was not possible to determine whether or not they had functioning ovaries. The remaining 200 patients have been observed for a period of 5 to 15 years. All had undergone radical mastectomy for cancer of the breast; at the time of operation, there had been no clinical manifestation of metastatic spread beyond the axillary lymph nodes, although there is no proof that these patients had no distant metastases.

A Table shows the survival rates of the observed 200 patients separated into the castrated and the uncastrated groups and into two age groups: those under 40 and over 40 years of age. Of 78 castrated women, 46 (59%) were alive at the time of the completion of this survey; of 122 not castrated, 44 (36%) were living. The most favorable results were obtained in the age groups over 40 with a survival rate of 68.8% among the castrates; the poorest results were found in the same age group among the noncastrates with a survival rate of only 35.3%. In the younger age group, the survival rate after castration was 52.5% as compared with that of 38% without castration.

The patients discussed in this review represent an unselected group except that only women below the age of 50 were considered; the majority of these patients were still menstruating regularly at the time of treatment, and in all of them some degree of ovarian activity may be assumed. It is of interest to note that Smith and Smith achieved the most striking improvements in survival rates in the age group between 50 and 59, causing them to advocate the use of castration in women up to the age of 70 with axillary metastases. The authors' favorable results in the age group between 40 and 50 (68.8% survival) are also suggestive and seem to indicate that the suppression of ovarian function may be of considerable importance in the later premenopausal, menopausal, and early postmenopausal periods. Whether axillary lymph-node involvement, emphasized by Smith and Smith



as being important, is of great significance appears doubtful in the light of recent investigations. Wyatt et al. could demonstrate that in over 50% of cases of primary malignant tumors in the medial and subareolar areas of the breast, secondary implants were found in the lymph nodes of the mammary chain; yet less than 15% of this group had axillary metastases.

Results as shown in a Table indicate that prophylactic castration significantly delayed the occurrence of metastases and subsequent death in that group which did not survive.

No practical methods to determine the degree of estrogen dependence of carcinomas of the breast in premenopausal women has yet been found which could facilitate the indication for castration. The results of this clinical survey, although comprising only 200 patients, appear to be sufficiently significant—even on a statistical basis—to indicate castration either by surgical removal or by adequate irradiation of the ovaries in all women with ovarian activity as soon as feasible after radical mastectomy. Castration also is suggested to all women beyond the menopause who still show signs of estrogen production as indicated by tests of the vaginal mucosa. It is known that an appreciable number of women, even after removal of the ovaries, exhibit evidence of extragonad estrogen production.

It is believed that these observations form sufficient justification for advocacy of prophylactic castration in all women with carcinoma of the breast who either are still menstruating regularly or otherwise exhibit signs of ovarian activity. (Rosenberg, M. F., Uhlmann, E. M., Prophylactic Castration in Carcinoma of the Breast: A. M. A. Arch. Surg., 78: 28-31, March 1959)

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#### From the Note Book

1. The U. S. Naval Hospital, Oakland, Calif. Blood Bank has been granted a Certificate of Accreditation by the American Association of Blood Banks, the first such accreditation to be given to a U. S. Military Hospital Blood Bank by the Association. In the letter accompanying the certificate, Dr. Ralph M. Hartwell, President of the Association, wrote, "Those to whom these certificates are issued should be proud of their achievement, of complying with the most stringent administrative and technical standards for blood bank operation that have been compiled to the present time."

(TIO, BuMed)

2. The Bureau of Medicine and Surgery has received a letter from the President and Vice President of Creighton University, Omaha, Neb., honoring the achievements of CAPT G. W. Hyatt MC USN who is presently serving at the Naval Medical School, National Naval Medical Center, Bethesda, Md.,



as Director, Tissue Bank Department. CAPT Hyatt received his medical education at Creighton, graduating in 1943. (TIO, BuMed)

3. Three Medical officers attached to the Bureau of Medicine and Surgery are scheduled to present papers at the Annual Meeting of the American College of Physicians in Chicago, Ill., 20 - 24 April 1959. CAPT H. L. Alvis MC USN, Director of BuMed's Submarine Medicine Division, will present a paper entitled, "Problems Common to Ships of Inner and Outer Space." CAPT C. F. Gell MC USN, Special Assistant for Medical and Allied Sciences, Office of Naval Research, will discuss "The Biological Stresses of Confinement under High Oxygen Partial Pressure," and CAPT N. L. Barr MC USN, Director of BuMed's Astronautical Division, will present a paper, "Surveillance and Measurement of Physiological Response to Space Flight." (TIO, BuMed)

4. The second class in Nuclear Nursing which began on the 16th of March 1959, at the Naval Medical School, NNMC, Bethesda, Md., is a prime example of the interservice and people to people relationship of a group intensely concerned with the humanitarian application of accelerated nuclear developments. The current class is composed of seven Nurse Corps officers of the Military Services, Department of Defense, one nurse from the Veterans Administration, an Assistant Professor of Nursing from the University of Colorado, and three Foreign Nurse Corps officers. (NNMC)

5. An excerpt from a personal letter to the Surgeon General from a Retired Medical officer states " . . . Some 31 years after graduating from medical school, I have finally entered private practice and find it most delightful and rewarding especially in a financial way. One thing is certain - when medical officers retire, they need have no fear for there are plenty of opportunities for men who have the training, background, and experience one picks up in passing during their Navy careers. You can reassure all of them to have no worries about their future . . . "

6. Rheumatic fever, arteriosclerosis, and hypertension constituted 73.5% of the causes of heart disease among 3,245 studied cases from all provinces of Turkey. In females, the leading cause was hypertension; in male, arteriosclerosis. Rheumatic heart disease was seen in the younger age groups and arteriosclerotic and hypertensive heart diseases were seen in the older age groups. (Am. Heart J., March 1959; I. Lutfi, M.D., L. Veral, M.D., R. Yuceulug)

7. The treatment of edema is one of the challenges presented to the physician. Excess retention of sodium and water is associated with a number of pathological conditions. Diuretic agents are valuable additions in therapy through their ability to block the reabsorption of sodium and water in the



renal tubules. However, these drugs do not cure the disease states associated with edema and the basic measures necessary to correct the underlying pathology should be used when such are available. (Dis. Chest, March 1959; M. Fuchs, M.D., J. Moyer, M.D.)

8. In a review of cases of acute myocardial infarction, it is concluded that: patients not receiving anticoagulation therapy have 3 times the morbidity and mortality of a comparable group receiving therapy; anticoagulants are effective and should be used in both good-risk and poor-risk patients; anticoagulants should be started as soon as possible after onset of the acute myocardial infarction. (A. M. A. Arch. Int. Med., March 1959; CAPT F. G. Conrad USAF (MC), N. O. Rothermich, M.D.)

9. An analysis of 1,810 frozen sections is presented to show their accuracy in specific organs. The accuracy obtained for the entire series was 97.6%. For specific organs, the accuracy varied between 94.3% for lymph nodes and 100% for other organs. For breasts and thyroids, the tissue most frequently examined, the accuracy was 98.1% and 96.5% respectively. (Surgery, March 1959; T. Winship, M.D., R. V. Rosvall, M.D.)

10. Fifty thymic tumors including 21 adenomas, 13 carcinomas, 2 malignant lymphomas, and 9 thymic hyperplasias are reported. Criteria of thymic cancer, cytologic peculiarities of the thymic tumors that accompanied myasthenia gravis, aregenerative anemia, or Cushing's syndrome and the differentiation by special staining of granulomatous thymic carcinoma from Hodgkin's disease are discussed. (J. Thoracic Surg., March 1959; G. D. Andritsakis, M.D., S. C. Sommers, M.D.)

11. A review of 15,784 deliveries with 472 perinatal deaths in the four years of study is presented in detail. The major causes of death were reviewed and tabulated. Prematurity and atelectasis were the most common causes. (Am. J. Obst. & Gynec., March 1959; J. T. Downs III, M.D., M. Kurilecz, M.D.)

12. The authors report the results of clinical and laboratory follow-up studies in a series of 42 patients in whom direct venous shunts have been carried out for portal hypertension. The follow-up period varied from 1 to 8 years. (A. M. A. Arch. Surg., March 1959; C. E. Sedgwick, M.D., H. A. Hume, M.D.)

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Use of funds for printing this publication has been approved by the Director of the Bureau of the Budget, 19 June 1958.



A Letter from the Surgeon General

25 March 1959

"Dear Doctor Gell:

As Surgeon General, I am particularly proud that the American Astronautical Society recently selected you as the recipient of the Melbourne W. Boynton Award for Space Medicine for 1958. This is a great honor to you and to the Navy Medical Corps.

Please accept my sincere congratulations as the recipient of this distinguished award, based on the scientific experimental work you conducted in explosive decompression and multicrew long duration confinement. The information obtained in this experimental work has led to the establishment of significant physiological criteria, which will be of inestimable value in the field of Space Medicine.

A copy of this letter is being forwarded to the Bureau of Naval Personnel for inclusion in your official record.

Sincerely yours,

/s/

B. W. Hogan  
Rear Admiral MC USN  
The Surgeon General"

Captain Charles F. Gell MC USN  
Office of Naval Research  
Department of the Navy  
Washington 25, D. C.

\* \* \* \* \*

Board Certifications - Inactive Reserve Officers

American Board of Anesthesiology

LT Stephen P. Murphy MC USNR  
LT Max M. Zung MC USNR

American Board of Internal Medicine

LCDR William T. Bailey Jr. MC USNR



American Board of Ophthalmology

LTJG Carl G. Freese Jr. MC USNR

American Board of Otolaryngology

LT Fairfax V. Breneman MC USNR

American Board of Pathology

LT Edwin B. Herring MC USNR

American Board of Pediatrics

LT Harvey Lee Carter Jr. MC USNR

LT Norman L. Miller MC USNR

American Board of Physical Medicine and Rehabilitation

CAPT Leo Rosenberg MC USNR

American Board of Psychiatry and Neurology in Psychiatry

LCDR Roswell H. Fine MC USNR

American Board of Surgery

LT Loring E. Sylvester MC USNR

American Board of Urology

LCDR Wilford A. Council Jr. MC USNR

LTJG Raymond M. Yow MC USNR

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Opportunities Open in Nuclear Submarine  
Medicine Program

Medical officers who are completing internship and those eligible for rotation by the first of July should be interested in knowing that a few vacancies exist in the Submarine Medicine Class convening early in July 1959.

The rapid expansion of the nuclear powered submarine program has dictated the development of a short course which now is included as part of the basic course. There still are opportunities for duty with diesel powered submarine squadrons and diving organizations. Early submission of applications by interested individuals is urged. They should be airmailed to Chief, Bureau of Medicine and Surgery (Attn: Professional Division), in accordance with BuMed Instruction 1520.3B. Any who desire more detailed information are encouraged to write to Submarine Medicine Division, BuMed.

(SubmarMedDiv, BuMed)

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Caisson Disease or Diving Accident  
NavMed-816

Report of Caisson Disease or Diving Accident (NavMed 816) was revised in February 1956, but reports still come in on the 1945 version of this report form. It is a reasonable supposition that very few of the older forms are still available. It would facilitate the organization of data from such reports if all activities would utilize the 1956 version in the future. The proper form should be available from the usual source of standard forms.  
(SubmarMedDiv, BuMed)

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Recent Research Reports

Naval Medical Research Institute, NNMC, Bethesda, Md.

1. Study of Induced Radiation in Dental Materials. NM 008 015.04.01, 14 May 1958.
2. Illustration of a Kinetic Analysis: The Myosin B-ATP-EDTA System. NM 01 01 00.02.04, 11 July 1958.
3. Thermal Radiation Burns in Rabbits. IV. The Distribution of Phosphorus and Radiophosphorus ( $P^{32}$ ) Fractions in Flash-Type Burns of the Rabbit Ear. NM 007 081.03.08, 6 November 1958.
4. Report on Social Psychiatry - A Therapeutic Community at the U. S. Naval Hospital, Oakland, Calif., NM 73 03 00.01.01, 7 November 1958.
5. Studies on the Functional Organization of the Vertebrate Retina. NM 04 01 00.02.01, 5 December 1958.
6. Further Response of Acetylcholinesterase and of Conduction in Bullfrog Sciatic Nerve to the Stereochemistry of Amine Inhibitors. II. NM 02 02 00 .01.10, 12 December 1958.
7. Changes in Infectiousness of Malarial Gametocytes. II. Analysis of the Possible Causative Factors. NM 52 01 00.04.01, 12 December 1958.
8. Acetylcholinesterase Inhibitory Activities of Muscarine and Muscarone Derivatives. NM 02 02 00.01.11, 18 December 1958.
9. A Tachometer for High-Speed Dental Rotary Cutting Instruments. Memorandum Report 58-8 related to NM 008 015.08, 31 December 1958.
10. Inhibition of Distinctive Cues and Psychophysical Judgment. Memorandum Report No. 58-9 related to NM 15 01 00.01, 31 December 1958.
11. Effect of Stimulus Predifferentiation on Subsequent Generalization of a Galvanic Skin Response. NM 15 01 00.01.02, 31 December 1958.
12. Some Pharmacologic Properties of Holothurin, an Active Neurotoxin from the Sea Cucumber. NM 02 02 00.01.12, 9 January 1959.



Naval Medical Research Unit No. 3, Cairo, Egypt

1. The Evaluation of Therapy of Schistosomiasis in a Controlled Population. Report No. 1. The Use of Intravenous Tartar Emetic in 31 Patients with Urinary Schistosomiasis. NM 72 01 03.3.01, June 1958.

Naval Air Development Center, Johnsville, Pa.

1. The Development of Dynamic Flight Simulation. Report No. 1, NM 11 02 12.6, 4 December 1958.
2. Adaptation to Positive Acceleration. Report No. 4, NM 11 01 12.3, 23 December 1958.

Naval School of Aviation Medicine, NAS, Pensacola, Fla.

1. A Study of Early Greyout Threshold as an Indicator of Human Tolerance to Positive Radial Acceleratory Force. Subtask No. 1, Report No. 1, NM 11 02 11, 10 July 1958.
2. Relationship among Fundamental Frequency, Vocal Sound Pressure, and Rate of Speaking. Subtask No. 1, Report No. 77, NM 18 02 99, 5 August 1958.
3. Reading of Messages of Different Types and Numbers of Syllables under Conditions of Delayed Side-Tone. Subtask No. 1, Report No. 78, NM 18 02 99, 10 August 1958.
4. Reception of Messages of Different Lengths. Subtask No. 1, Report No. 79, NM 18 02 99, 15 August 1958.
5. Effect of Specified Levels of White Noise upon Flicker Fusion Frequency. Subtask No. 1, Report No. 80, NM 18 02 99, 18 August 1958.
6. Relationship between the Frequency Spectrum of Speech and Scores Yielded by Multiple-Choice Intelligibility Tests. Subtask No. 1, Report No. 81, NM 18 02 99, 21 August 1958.
7. Stabilization of Multiple Regression Weights through Factor Analysis - An Empirical Evaluation. Subtask No. 1, Report No. 30, NM 14 02 11, 26 August 1958.
8. A Study of Discrepancy between Level of Aspiration and Ability. Subtask No. 1, Report No. 16, NM 16 01 11, 1 September 1958.
9. Transfer Effects of Special Training upon Pre-Solo Flight Training. Subtask No. 13, Report No. 1, NM 16 01 11, 18 September 1958.

Naval Medical Research Unit No. 2, Taipei, Taiwan

1. Mouse Adaptation of the Asian Influenza Virus. NM 52 05 02.4.3, 1 November 1958.
2. Goat Red Blood Cells in the Agglutination Test for Infectious Mononucleosis. NM 52 11 02.4.2, 25 February 1959.



BUMED INSTRUCTION 6220.2

18 March 1959

From: Chief, Bureau of Medicine and Surgery  
To: Ships and Stations Having Medical Corps Personnel  
  
Subj: Poliomyelitis (Letter Report, Med-6220-2)  
  
Ref: (a) BuMedInst 6310.4, Subj: Morbidity Report, NavMed-1390  
(Med-6310-2); and Special Epidemiological Reports (Med-6200-2)

This instruction requires a report on patients with poliomyelitis.

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BUMED NOTICE 6320

30 March 1959

From: Chief, Bureau of Medicine and Surgery  
To: All Naval Activities in Areas Other than the Continental United States,  
Alaska, Hawaii, and Puerto Rico  
  
Subj: Dependents' Medical Care in Civilian Facilities in Areas Outside the  
Jurisdiction of the Executive Agent  
  
Ref: (a) SecNavInst 6320.8 (CH-2)  
(b) BuMedInst 6320.22

This notice clarifies the changes to the dependents' medical care program which became effective 1 October 1958, from the standpoint of authorized care in civilian medical facilities under the provisions of reference (a).

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BUMED NOTICE 1306

31 March 1959

From: Chief, Bureau of Medicine and Surgery  
To: Ships and Stations Having Medical Personnel  
  
Subj: Hospital Corpsmen; availability, training, distribution and utilization of

This notice disseminates information relative to the availability of hospital corpsmen, and reiterates the policy of the Bureau of Medicine and Surgery relative to their training, duty assignment, and utilization.

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**DENTAL****SECTION**

Dental Officers Selected for Long  
Courses of Instruction

The Dental Training Committee, Dental Division, Bureau of Medicine and Surgery, selected the following Navy Dental Corps officers for postgraduate, residency, and specialized training during Fiscal Year 1960:

General Postgraduate Course, U. S. Naval Dental School

CDR Amos W. Cave DC USN	LCDR Alan E. Smith DC USN
CDR Charles W. Folkers DC USN	LT Robert J. Adams DC USN
CDR William R. Gabrels DC USN	LT Gerald M. Bowers DC USN
CDR Seymour (n) Hoffman DC USN	LT Arthur L. Davy DC USN
CDR Clyde R. Parks DC USN	LT Thomas A. Garman DC USN
CDR Edwin M. Sherwood DC USN	LT Walter J. Gorman DC USN
CDR Carl L. Wilhelm DC USN	LT Jefferson F. Hardin DC USN
LCDR Andrew J. Bartosh DC USN	LT Donald C. Hauck DC USN
LCDR Theodore E. Carlson DC USN	LT William R. Hiatt DC USN
LCDR Robert (n) Cohen DC USN	LT Harris J. Keene DC USN
LCDR Esthel D. K. Ikenberry DC USN	LT John P. Kelley DC USN
LCDR "C" P. Johnson, Jr., DC USN	LT Wendell E. Montgomery DC USN
LCDR Samuel J. Sachs DC USN	LT Steven W. Perand DC USN
LCDR John R. Schweitzer DC USN	LT Louis R. Pistacco DC USN

There were 53 applicants for the 28 billets in the General Postgraduate Course. Because it is considered desirable in the Bureau of Medicine and Surgery that all Regular Navy Dental officers below the grade of Captain receive this training, those whose requests were disapproved were encouraged to reapply.

Residency Training in Oral Surgery

CAPT Albert L. Oesterle DC USN - U. S. N. H., Great Lakes, Ill.  
 CDR Ingram W. Ogden DC USN - U. S. N. D. S., NNMC, Bethesda, Md.  
 LCDR Harry J. Dennis DC USN - U. S. N. H., Portsmouth, Va.  
 LCDR Homer S. Samuels DC USN - U. S. N. H., St. Albans, Long Island, N. Y.



Residency Training in Prosthodontics, U.S.N.D.S., NNMC, Bethesda, Md.

CDR Marvin Carmen DC USN

CDR Tomas C. Pablos DC USN

Residency Training in Periodontics, U.S.N.D.S., NNMC, Bethesda, Md.

LCDR Corey H. Holmes DC USN

Specialized Courses, U.S.N.D.S., NNMC, Bethesda, Md.

CDR Peter C. Conglis DC USN - Periodontics

LCDR Stephen O. Bartlett DC USN - Maxillofacial Prosthesis

Long Course in Civilian Institution

CDR Walter J. Hillis DC USN - Periodontics

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New Vice President for Dental Research Unit

CAPT James A. English DC USN, Head, Dental Branch, Office of Naval Research, and Head, Dental Branch, Research Division, Bureau of Medicine and Surgery, was elected Vice President of the International Association for Dental Research during the recent meeting of the Association in San Francisco, Calif.

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Reenlistments of Dental Technicians

During the period, July through November 1958, 40.5% of all eligible career petty officer separatees of the Dental Rating Group XI reenlisted in the Navy. The following is a breakdown of reenlistments by rate:

Chief Dental Technician - 100%  
Dental Technician, First Class - 100%  
Dental Technician, Second Class - 38%  
Dental Technician, Third Class - 18%  
Total Over-All Average - 40.5%

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Revised Dental Standards for Women

Attention is invited to the recently instituted revised dental standards for original enlistment of women in the Navy and Marine Corps. Applicants



must have at least twenty teeth. Satisfactory artificial replacements may be counted in lieu of natural teeth. An applicant must have no more than five carious teeth as determined by the Type Four screening examination as described in Chapter 6, Manual of the Medical Department.

The revised dental standards are effective on receipt of Advance Change 7-10, Manual of the Medical Department.

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## RESERVE SECTION

### Training in the Naval Reserve

#### Types of Training

1. Active duty for training is full time duty with the Regular component of the Navy for training purposes and is provided as follows:

- a. Active duty for training
- b. Special active duty for training
- c. Group active duty for training

2. Inactive duty training is any of the training, instruction, duty, and appropriate duties, or equivalent training, instruction, duty, appropriate duties, or hazardous duty performed with or without compensation by members of the Naval Reserve as prescribed by the Secretary of the Navy and in addition thereto includes the performance of special additional duties, as may be authorized by competent authority, by such members on a voluntary basis in connection with the prescribed training or maintenance activities of the unit to which Reservists are assigned. Work or study performed by such Reservist in connection with correspondence courses shall be deemed inactive duty training for which compensation is not authorized. The following types of inactive duty training are provided:

- a. Regular drills
- b. Equivalent instruction or duty
- c. Appropriate duty
- d. Correspondence courses
- e. Naval Reserve communication network



### Active Duty for Training

(1) Active duty for training is required for personnel attached to or associated in pay status with pay units. Active duty for training is also authorized for a limited number of other personnel including those who are performing appropriate duty, associated in non-pay status with pay units, attached to non-pay units, and those in the Active Status Pool.

(2) Commandants are authorized to prescribe the type of active duty for training for Reservists under their jurisdiction. The type of duty assigned should be that most appropriate to the Reservist's grade and designator or rating and classification, his Naval Reserve status, and his prospective mobilization billet.

(3) The Chief of Naval Personnel will issue schedules and quotas for active duty for training for Reservists.

(4) Active duty for training with or without pay, exclusive of travel time, shall not exceed 14 days annually, unless specifically authorized by the Chief of Naval Personnel.

(5) Commandants are authorized to release Reservists attached to or associated in pay status with pay units of the Naval Reserve from their obligations to perform active duty for training upon evidence of good and sufficient reasons. Reservists failing to perform the required training shall submit a request for waiver containing the following information:

(a) Fiscal year for which submitted

(b) Date of enlistment or appointment

(c) Date assigned to the pay unit

(d) Dates of active duty or active duty for training performed during preceding 4 years, or since enlistment (if serving in first enlistment).

(e) Previous years released from obligation to perform active duty for training, stating the reason.

(f) Number of drills attended during preceding fiscal year

(g) Reasons for failure to perform active duty for training. Commanding officers shall verify the information contained therein and forward the request with an appropriate recommendation to the cognizant commandant for action. All requests of this type concerning members of any organization shall be forwarded at the same time by the commanding officer with recommendations.

(6) Active duty for training will be performed in ships or shore activities designated for this purpose by the commandant in accordance with current instructions issued by the Chief of Naval Personnel.

(7) Civilian employees of the Navy may not be assigned active duty for training in the same billet nor in the same office in which employed as a civilian. Further, they shall not perform active duty for training in conjunction with, or concurrently with, the performance of any civilian travel orders.



### Special Active Duty for Training

(1) Special active duty for training is defined as active duty for training in excess of 14 days but not more than 90 days' duration. Special active duty for training may be approved by the Chief of Naval Personnel from time to time for special purposes and, when approved, may be performed in addition to regularly scheduled periods of active duty for training.

### Group Active Duty for Training

(1) Reservists may be authorized to perform group active duty for training in ships or at shore activities. Pay is not authorized for this type of training.

(2) Group active duty for training is computed separately from the annual 14 days' active duty for training and may be performed in addition thereto without prior approval of the Chief of Naval Personnel.

(3) The combining of a series of group active duty for training periods totaling 14 days or more cannot be used as a substitute for the annual 14 days' active duty for training required of personnel of pay units.

\* \* \* \* \*

## AVIATION MEDICINE DIVISION



### Status of Navy Full Pressure Suit Program

1. The full pressure suit and helmet consist of (less controller) about 1600 parts. The Research and development on the full pressure suit began at the Air Crew Equipment Laboratory, U.S. Naval Air Material Center, Philadelphia, Pa., in 1946.

2. Current Production Model Suit - Mark IV, Light Weight Suit, being manufactured by the B. F. Goodrich Company.

3. Aircraft Configured for the Full Pressure Suit

a. Compatibility of the suit with the F4D-1 aircraft has been approved by the Naval Air Test Center, Patuxent River, Md., provided the ejection seat face curtain handle is extended. This is not an extensive job and the Naval Air Test Center has satisfactorily modified their test aircraft to an acceptable



configuration. (VX-3 is conducting further studies of the suit-urgent compatibility problems.)

b. The Naval Air Test Center approved the compatibility of the suit with the F8U-1, -1P, and -2 aircraft, provided:

(1) The D-500 Composite Disconnect is removed from the aircraft. (F8U-ASC-264)

(2) The Back Pan Control System is modified by removing the emergency oxygen bottle and providing a hose to connect to the existing emergency oxygen bottle in the seat pan. (See Aviation Clothing and Survival Equipment Bulletin Number 20-58.)

In advance of the issuance of these two modification instructions, the Bureau of Aeronautics has purchased 108 kits covering both required modifications. Fifty-four (54) of these kits are currently available at the Naval Air Station, Norfolk, and the other fifty-four (54) at the Naval Air Station, North Island. Accordingly, the necessary F8U modifications can be accomplished at any time that they are required.

c. Although the F4H-1 aircraft is not of immediate concern in Fleet operations, contractor test pilots and NPE pilots (U. S. Navy test pilots specifically assigned to evaluate the aircraft) have successfully flown the aircraft while wearing the suit with no problem areas reported to date.

d. The A3J-1 aircraft is configured to accept the suit; NPE and contractor test pilot flights indicate there are no major problems with the suit.

#### 4. Pressure Suit Training Program Status

a. Full Pressure Suit Training Units: Two of these units are in existence; one at the Naval Air Station, Norfolk, and one at the Naval Air Station, North Island. In addition to fitting, training and indoctrinating pilots, they also have the responsibility of assisting units in the field in solving various operational problems. To date, these units have indoctrinated several hundred pilots who have since flown the suit in actual aircraft.

b. Parachute Riggers' Training: The Parachute Riggers' School, Naval Air Technical Training Unit, Lakehurst, N. J., has had a Full Pressure Suit Course since May 1956. This is a 4-week course that can be taken either separately or as a part of the 17-week Parachute Riggers' Course. To date, 127 students have been graduated and, of this number, 47 have taken the 4-week course only.

c. Training Film: A squadron training film has been prepared and is presently being edited for release in April 1959. This film details suit sizing, donning procedures, and general familiarization with the equipment.

d. Training Devices: The Naval Training Device Center's Device 9-A-11, a series of projectable color slides, covering details of the equipment is currently available in the supply system.



e. Publications: Adequate publications are in the supply system or are scheduled for early issue. These include:

(1) NavAer 00-80T-71, Space Training Unit. This is an indoctrination publication of full pressure suits and is currently available in the supply system. (It is being brought up to date to cover the Mark IV suit.)

(2) Maintenance Handbooks and Illustrated Parts Catalogs are in the final stages of preparation and will be available in the supply system on or before 1 June 1959.

(3) NavAer 00-8022-127, Charts. This is a series of illustrative charts on pilot equipment including pressure suits; sets are currently available in the supply system.

(4) Aviation Clothing and Survival Equipment Bulletin covering the operation, test, and general use of the Mark IV suit and control system has been prepared and is now available. Two suit controller Aviation Clothing and Survival Equipment Bulletins, Numbers 2-59 and 3-59, are also available. The Aviation Clothing and Survival Equipment Bulletin Number 1-59 on the Mark IV suit is under revision. A new printing is expected in May 1959.

5. Test Equipment: This area is considered to be adequately covered and consists of the following:

a. Portable Test Kits for testing against suit leakage and giving pilots ground pressurization checks are currently available. These kits are also of value in indoctrinating pilots in the use of the suit. Seventy-five (75) kits are currently in the supply system and the Aviation Supply Office is procuring additional units at the rate of one for each ten suits.

b. Oxygen Regulator Test Kits. Conventional O<sub>2</sub> regulator test stands have been satisfactorily modified to test the pressure suit O<sub>2</sub> regulator and suit controller. Kits are available for this modification in the ComNavAirLant area as follows:

Three (3), Naval Air Technical Training Unit, Lakehurst, N. J.

One (1), Full Pressure Suit Training Unit, Norfolk, Va.

One (1), VX-3, Oceana, Va.

One (1), O&R, Norfolk, Va.

One (1), O&R, Jacksonville, Fla.

One (1), O&R, Cherry Point, N. C.

One (1), Quonset Point, R. I.

Instructions for the modification of the test stand are contained in Section X, NavAer 17-15BC-505, currently available in the supply system.

c. Communications Test Kits for checking out the helmet communications gear are available as required and are considered to be of great value in providing an easy means of communicating with a suited pilot. Five of these kits have been purchased for purposes of evaluation.

6. Required Ventilation and Air Conditioning Support: As a result of the pressure sealing properties of the suit, adequate ventilation and cooling



is mandatory, particularly during the warm months of the year. This ventilation must be supplied from the time of suit donning until the aircraft system can take over and supply the required air and temperature control.

a. Ready Room Ventilation for NavAirLant Carriers:

(1) CVA-42 (ROOSEVELT) is currently equipped to supply required ready room ventilation and has twenty (20) pressure suit outlets in one of the four ready rooms. The remaining three will be modified in 1960.

(2) CVA-59 and -60 will receive a similar system at next overhaul in 1961 since this modification has been given no priority for present overhaul.

(3) CVA-62 will be equipped in the same manner as CVA-42 in all ready rooms by April 1959.

(4) CVA-11 will have one ready room equipped with twenty (20) outlets in 1959.

b. Ready Room Ventilation for Shore Stations:

(1) The most satisfactory system for immediate installation is a modification of the hangar compressed air system. This modification consists of installing a pressure reducing valve and filter, then manifolding the reduced and filtered air pressure to 6-8 ready room outlets. VX-3 has this modification installed and reports satisfactory results.

(2) The Bureau of Aeronautics is working with the Bureau of Yards and Docks to develop plans for air conditioning hangar ready rooms and supplying lockers and suit drying facilities. This work is scheduled to begin in 1959 at Lemoore, Calif.

c. Ready Room to Aircraft Ventilation:

(1) A very promising nine-pound portable battery-powered ventilation unit is currently under test at the Air Crew Equipment Laboratory.

(2) A two-wheeled hand-pulled unit is under evaluation at the Full Pressure Suit Training Unit, Naval Air Station, North Island, and preliminary reports indicate very good results.

(3) Onan Kab Coolers mounted on panel trucks will be evaluated by the Naval Air Test Center and VX-3. Action has been taken to supply one to the Naval Air Station, Jacksonville, Fla.

(4) In addition to the above, the Bureau of Aeronautics has three Research and Development projects to further improve this area of ventilation.

d. Standby in Cockpit Ventilation (Engine Off):

(1) Units under c. (1) and (2) above, are expected to be satisfactory for this purpose.

(2) NR-1 and NR-2 carts are currently available for this requirement, but due to size and low pressure delivery, are not considered entirely satisfactory.

(3) A suit vent from the source of air for engine air starters is being investigated and looks promising.



(4) The Bureau of Ships is investigating the feasibility of running air lines on carrier decks to be available for each aircraft.

e. Ventilation During Low Throttle Operation (Landing and Taxi):

(1) The F8U-1 system is considered marginal in this condition and Chance Vought has been requested to submit an ECP for improvement of the supply of temperature controlled air.

(2) Not enough experience has been obtained with the F4D-1 to determine the adequacy of its system for the idle condition. Should it prove unsatisfactory or marginal, an ECP will be immediately requested.

(3) A3J-1 and F4H-1 aircraft are apparently satisfactory.

7. Full Pressure Suit Availability

a. As previously stated, the current production model suit is designated the Mark IV and, although not the ultimate, is considered to be operationally acceptable.

b. A total of 85 of these suits have been delivered.

c. In addition to the above, 100 of the earlier Mark III suits are being modified to the Mark IV configuration by the contractor. All of these modified suits will be delivered by April 1959, giving a total of 185 suits as of that date.

d. The Aviation Supply Office is purchasing 400 additional Mark IV suits to be delivered at the rate of thirty (30) per month starting in March 1959. This new contract will bring the total of Mark IV suits to 585 by May 1960.

e. Spare parts are available now to support all currently available Mark IV suits and the Aviation Supply Office is procuring spares in connection with the new 400-suit contract for concurrent delivery with suits.

\* \* \* \* \*

Liquid Oxygen

A military specification on oxygen, aviator's breathing, liquid MIL-0-21749 (Aer) was issued by BuAer on 17 December 1958. Portions of this specification are quoted below for information:

"3. Requirements

3.1 Purity. The oxygen when gasified in a closed container shall contain not less than 99.5% by volume oxygen. Except for moisture and other minor constituents, the remainder shall be argon and nitrogen.

3.2 Minor constituents.

3.2.1 Moisture. The oxygen shall contain not more than 0.02 milligrams of water vapor per liter of gas at 70° F. and 760 millimeters of mercury pressure.

3.2.2 Hydrocarbons and other. The oxygen shall contain not more than the concentration of the constituents shown in Table I.



TABLE I

<u>Constituent</u>	<u>Maximum Concentration in Parts per Million</u>
CO <sub>2</sub>	5.0
CH <sub>4</sub>	1.0
C <sub>2</sub> H <sub>2</sub>	0.05
C <sub>2</sub> H <sub>4</sub>	0.2
C <sub>3</sub> † Hydrocarbons	1.0
N <sub>2</sub> O	0.1
Halogenated Compounds	0.1
Other	0.1

3.3 Odor. The oxygen shall exhibit no noxious or nauseating odor.

#### 4. Quality Assurance Provision

##### 4.4 Test Procedure

4.4.1 Purity. Place a sufficient quantity of mercury in a 100 milliliter calibrated nitrometer, provided with a two-way stopcock and a two-way outlet, and properly connected with a balancing tube. Connect one of the outlet tubes of the nitrometer with a gas pipet of suitable capacity. Place in the pipet a coil of copper wire which extends to the uppermost portion of the bulb, and add about 125 milliliters of ammonium chloride-ammonium hydroxide test solution (made by mixing equal volumes of water and 27% concentrated ammonia; then saturate with ammonium chloride) (see 6.2). Draw the liquid (free from air bubbles) through the capillary opening connection and stopcock opening in the nitrometer by reducing the pressure in the nitrometer tube and opening the stopcock controlling connection with the gas pipet. Then close the stopcock. Having completely filled the nitrometer, the other stopcock opening, and the other intake tube with mercury, draw into the nitrometer exactly 100 milliliters of oxygen by reducing the pressure in the tube. Close the stopcock. Increase the pressure on the oxygen in the nitrometer tube, and open the stopcock controlling the connection with the gas pipet. Close the stopcock, and rock the pipet gently, providing frequent contact of the liquid, gas, and copper spiral. At the end of 15 minutes, when most of the oxygen will have been absorbed by the liquid, facilitate the absorption of the remainder by drawing some of the liquid into the nitrometer tube and forcing the residual gas back upon the



surface of the liquid in the gas pipet. Again rock the pipet until no further diminution in the volume of the gas occurs. Draw the residual gas, if any, into the nitrometer tube, and measure its volume.

#### 4.4.2 Minor Constituents.

4.4.2.1 Moisture. The moisture content shall be determined by use of an approved dew point indicator such as the McMahon type.

4.4.2.2 Hydrocarbons and other. Hydrocarbons and other constituents listed in Table I may be determined using an infra-red spectrophotometer capable of detecting them in the amounts listed in the Table or by other approved methods.

4.4.2.3 Odor. Odor shall be determined as follows:

(1) Cover the bottom of a clean 400 cubic centimeter (approximately 1 pint) beaker or similar type container with a clean dry filter paper or suitable absorbent paper. Provide a watch glass cover or some means of partially covering the top of the container. This cover is required to prevent odors from the surrounding atmosphere being absorbed into the liquid oxygen sample.

(2) Collect approximately 200 cubic centimeters (approximately 1/2 pint) of liquid oxygen in the beaker or container. The container should be covered while collecting the sample and for the remainder of the test. Note: Do not hold beaker with bare hands while collecting sample.

(3) Allow sample to evaporate to dryness in an area free of air currents or any odors.

(4) Upon reaching dryness, raise cover and smell vapors in beaker. The frost which may collect on the outside of the beaker may, upon melting, give off odors also.

#### 6. Notes.

6.1 Liquid oxygen plants whose source of air is odorous or otherwise contaminated may require special operating procedures or equipment to produce breathing oxygen.

6.2 The test for purity requires the use of freshly prepared ammonium chloride-ammonium hydroxide solutions. These solutions should be aged by making five or six runs before taking test data for purity.

6.3 Liquid oxygen may be purchased by the gallon, which produces 115 cubic feet at 70° F. or by the cubic foot. One thousand cubic feet equals 8.68 gallons of liquid oxygen. One gallon of liquid oxygen weighs 9.55 pounds. Contract should specify weight or volume being purchased.

6.4 Requests for sampling equipment or tests of manufacturer's plants shall be forwarded to:

Chief, Bureau of Aeronautics (AE-42)

Department of the Navy

Washington 25, D. C.

\* \* \* \* \*



### Intraocular Pressure

Twenty-five years ago, the canal of Schlemm was regarded as a safety valve in the human eye, so that a rise of intraocular pressure above normal limits was counteracted by a flow of aqueous from the anterior chamber into the episcleral veins. Since that time, the measurement of this outflow has been the subject of careful study, culminating in the development of methods whereby it can be accurately measured. Tonography and the bulbar pressure test can show in a few minutes whether the function of the drainage channels is below or above average, thereby enabling ophthalmic surgeons to treat their cases of glaucoma with some precision. Such studies have tended to divert the attention of workers engaged in research on the eye to the anterior chamber, and particularly to its angle. Thus, recent literature abounds in articles on gonioscopy, tonography, pathological changes in the angle of the anterior chamber, pressure changes in the episcleral veins, and so on. Indeed, further knowledge of the regulation of the intraocular pressure and glaucoma would almost seem to lie in a better understanding of outflow dynamics.

A reaction is setting in against this mode of thought and two complementary lines of research are being followed today. The first is biochemical. The discovery of the hypotensive action of acetazolamide in glaucoma has led to a renewed interest in the chemistry of the eye and to the resuscitation of the theory that a redox mechanism, maintained by enzymatic activity in the ciliary epithelium, is responsible for much of the secretion of the aqueous and provides energy for its flow. According to this theory, hydroxyl ions are generated continuously by the oxidation of reduced cytochrome oxidase in the ciliary epithelium, and the neutralization of these ions by carbon dioxide accounts for the excess of bicarbonate which is found in the aqueous and which gives it an osmotic pull higher than that of the blood. Acetazolamide acts by inhibiting carbonic anhydrase, the enzyme which normally controls the formation of bicarbonate. This theory, although questioned in points of detail, suggests that the formation of intraocular fluid is due to a peripheral mechanism under local physico-chemical control. A failure in this control may theoretically produce a type of glaucoma which is due to excessive production of aqueous. Recently, a series of such cases was published, presenting raised intraocular pressure in association with a normal outflow as measured tonographically.

The second line of research stems from the supposition that there is a controlling central nervous center, possibly in the hypothalamus. There are many clinical and experimental findings which are difficult to explain without this supposition, particularly the concensual changes in intraocular pressure when alterations are induced in the fellow eye. This hypothesis has led to studies of the effects on the intraocular pressure of stimulation of the cervical sympathetic trunk and the third and seventh cranial nerves, and to



studies of the effect of stimulation of the fifth cranial nerve. Work has also been reported on the changes in intraocular pressure resulting from stimulation of the central nervous system; in particular, the diencephalon has received close attention because this part of the brain is known to influence many bodily functions. Responses have been obtained showing independent variations of the intraocular pressure on stimulating points in the posterodorsal region of the diencephalon and from a circumscribed area in the medial hypothalamus. The authors believe that their findings are compatible with the view that the diencephalon influences the intraocular pressure, but they do not allow the conclusion, as yet, that such influence is in the nature of a controlling mechanism. Both lines of thought require considerable experimental exploration. In the meantime, it would seem desirable to study a series of cases of glaucoma in man wherein the outflow channels are functionally normal, for it may be possible in such a group to decide whether the anomaly in fluid formation and intraocular pressure is primarily neurogenic or biochemical, and whether centrally or peripherally determined. (Medical Digest, Vol. 4, No. 8, August 1958; and Brit. M. J., 1:387, 1958)

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#### Health Hazards

Preventive medicine is an important facet of aviation medicine. Ground crew personnel are particularly exposed to occupational health hazards during maintenance procedures. With this in mind, the following excerpts from Occupational Health Reports are reported:

"The incidence of dermatitis in this station has increased significantly during the past year. In looking over the possible causes, it was ascertained that many complex new materials are now being handled and that our system of issue of protective creams was antiquated. It was the custom to issue pound-size jars that were, in many cases, used jointly by several employees. Occasionally, there were restrictions in the issue which discouraged the use of these creams. It was also found that many work areas were relatively distant from washing facilities, discouraging frequent washing of the hands and encouraging simple wiping under which conditions protective cream had no effect. A pilot study was conducted in a large shop where aircraft engines and components are handled, overhauled, and repaired. An inventory was taken of the miscellaneous materials handled, number of employees concerned, and the availability of washing facilities. It was concluded that for the best skin hygiene, dispensers for both waterless cleanser and protective creams would be the most efficient method. Areas were selected for relocation of these units. This program has not yet been placed into effect, but it is anticipated that



these changes will be instrumental in reducing the incidence of industrial dermatitis. "

"A nearby air station requested a survey of aircraft cleaning operations due to 14 cases of skin conditions (varying from mild irritations to straight burns) which occurred following the use of an emulsion-type grease-cleaning compound to remove oil film and carbon soil from the surfaces of aircraft. This material comes in two types:

Type I - (Turco) Stock No. RF6850-559-2835-G500

Type II - (Delchem) Stock No. RF6850-559-2836-500

Type I, a light duty cleaner is normally used; but Type II, a heavy duty cleaner was issued to the activity by the Supply Department as a substitute. Type I is non-phenolic, whereas Type II contains a maximum of 3% phenol by weight. Exposed personnel experienced a burning sensation followed by a reddening of the skin with subsequent peeling. The use of face shields, rubber gloves, and wearing of long-sleeved shirts was recommended in conjunction with the use of this material. "

\* \* \* \* \*

#### New Carrier

The fighting capability of the carrier will soon be greatly enlarged, for now on the horizon is the first nuclear powered attack carrier—the USS ENTERPRISE. As a result of its radical power plant, the ENTERPRISE will be able to carry appreciably more planes than the conventional, equivalent sized carrier. It will also be able to carry far more aviation fuel. In addition, owing to its atomic engine, the ship will be able to remain "on the line" almost indefinitely under combat conditions.

The new ship is being built at the Newport News Shipyard, Newport News, Va. Work on the carrier has reached the stage where shielding for the nuclear reactor which will drive the propulsion machinery is now being installed. (ONR Research Reviews, January 1959)

\* \* \* \* \*

#### Aviation Physiology Training/Indoctrination

OpNav Instruction 3740.3B was issued on 25 February 1959. Attention is invited to this revised instruction, particularly as it pertains to the minimum indoctrination required for selected passengers, foreign nationals, and non-crewmember service personnel prior to travel in high performance aircraft.

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### Miniature Flight Surgeons' Wings

The Permanent Uniform Board has approved the design for miniature Flight Surgeons' Wings and arrangements have been made for their manufacture. They should be available for purchase after 1 May 1959.

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### Policy

The U. S. Navy Medical News Letter is basically an official Medical Department publication inviting the attention of officers of the Medical Department of the Regular Navy and Naval Reserve to timely up-to-date items of official and professional interest relative to medicine, dentistry, and allied sciences. The amount of information used is only that necessary to inform adequately officers of the Medical Department of the existence and source of such information. The items used are neither intended to be, nor are they, susceptible to use by any officer as a substitute for any item or article in its original form. All readers of the News Letter are urged to obtain the original of those items of particular interest to the individual.

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